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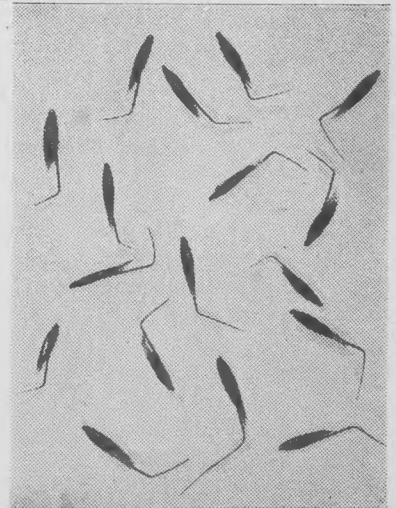
THE CONTROL OF WILD OATS IN ALBERTA



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Wild oats cause a greater loss to agriculture in Alberta than any other weed.

The wild oat is an annual which is closely related to the cultivated varieties. Probably this fact is confusing to many and leads them to believe that wild oats should be easy to control. They have several characteristics, however, not possessed by the cultivated oat which enables them to survive intensive cultivation and adverse conditions. These characteristics may be listed as follows:

- I. Delayed germination or dormancy of seeds.
- II. Necessity for "after-ripening" of seeds.
- III. Low temperature requirements for germination.
- IV. A small piece of a seedling wild oat may grow.
- V. Wild oats ripen and shatter early.
- VI. Wild oats cut when immature will produce viable seeds.
- VII. Seeds of wild oats may remain unharmed for several years in land seeded to grasses and legumes.

In order that the wild oat menace can be combatted successfully it is necessary that we consider carefully the noxious characteristics of the weed. No thorough study of these characteristics has been carried out but on the basis of the experimental work which has been done the following information is submitted:

1. Delayed Germination or Dormancy:

The characteristics of delayed germination or dormancy is illustrated by the fact that two wild oats grown on the same plant, falling on the ground at the same time, and subjected to the same conditions in or on the ground, may not germinate within two to five years of each other. This means that the wild oat problem cannot be solved in one or two years, but that the whole farm programme must take into consideration the suppression of this pest.

II. The Necessity for After-Ripening:

The wild oat seed, unlike commercial grains, shatters or becomes detached from the plant while it still contains a high percentage of moisture. The seed must lose this original moisture and later receive a further supply before germination will take place. It would appear that the drying of the kernel is accompanied by certain changes or processes within the seed itself. This process is called "after-ripening." The length of time required for drying will, of course, depend on weather conditions and soil moisture conditions immediately following the shattering of the seeds. This in turn determines to a considerable degree the length of time cultivation should be delayed after harvesting the crop. Burying the current season's crop of wild oats in moist soil by cultivation,

before the after-ripening process is complete, may indefinitely postpone its germination. Such seed will remain dormant until brought to the surface and dried, or until the soil in which it is buried is stirred by cultivation and allowed to dry out, permitting the after-ripening process to be completed.



The wild oats in this picture have been kept under moist cool conditions for several months. None have germinated and no sign of decomposition is in evidence.

Some seeds are very strongly dormant and do not "after-ripen" within the period of dry weather occurring between harvest and the next seeding time. These seeds require long exposure to surface conditions before they will germinate. They are a very important factor in the wild oat problem. The importance, therefore, of shallow cultivation which will keep these seeds near the surface cannot be over emphasized.

The whole question of fall cultivation requires careful study under conditions existing in each case. No definite dates of operation can be given. The object should be to allow the current season's crop of wild oats as much time to dry out as possible, and still cover them in time to have them germinate before the frost; or failing this so they will germinate early the next spring. The individual will have to use his own good judgment as to the correct time to cultivate under his own farm conditions.

III. Low Temperature Required for Germination:

Experimental work has shown that the wild oat germinates best if started at temperatures between freezing and 50° Fah. This accounts for the fact that one or two crops of wild oats may be killed early in the summer fallow year, and little further growth of the weed may occur during the remainder of the season. The crop may be badly infested in the succeeding year, however, be-

cause many of the wild oats present in the soil failed to grow during the fallow year.

Long dry periods, in the summer fallow year, may merely make conditions favourable for "after-ripening" but not for germination. Where this occurs the result will be an increased infestation in the crop the following season. Where land is fallowed and a satisfactory growth of wild oats is not obtained it will be necessary to delay seeding the next year until at least one crop of wild oats can be killed by cultivation.

IV. A Small Piece of a Wild Oat Seedling May Grow:

Only thorough cultivation, from the time the wild oat seedling has come through the ground until it has reached a height of four or five inches will be effective. Experimental evidence has shown that if the seedling plant is cut into pieces, the pieces containing nodes are capable of establishing roots and producing normal plants. In order to make a complete "kill," therefore, cultivation is often delayed until the wild oat plant is about five inches high.

V. Wild Oats Ripen and Shatter Early:

Many wild oats mature and fall to the ground before the common cereals are ripe. Many more are threshed with the crop and may cause further trouble through the crop being used as seed or being fed to live stock.

VI. Wild Oats Cut When Immature Will Grow:

Wild oat plants cut when the first kernels are only four to six days out of the sheath will produce seeds which will germinate. This point is particularly important where greenfeed is grown as a cleaning crop. In many cases the greenfeed is not cut soon enough and the wild oats ripen in the sheaves. The sheaves are fed to live stock which are allowed to roam over the fields and reinfest the land through the wild oats contained in the droppings. In other cases the sheaves containing wild oats are fed to work horses and reinfestation takes place in a similar manner.

VII. Wild Oats May Remain Unharmful for Many Years in Land Seeded to Grasses and Legumes:

Many farmers have been badly discouraged when they have attempted to use forage crops to control wild oats. Numerous instances are on record where fields have been left down to forage crops for several years, and when they were replowed and seeded with clean seed it was found that the wild oat infestation still remained. This is discussed later in the pamphlet under the section "Forage Crops."

Fertilizer in Wild Oat Control:

Anything that can be done to speed up the growth of a crop seeded on land infested with wild oats will assist in controlling this pest.

A fertilized crop will make a more rapid early growth than one which has not been fertilized. The fertilizer is placed in the drill row with the grain, and so does not benefit the wild oats between the drill rows. The result is a more rapid development of the grain and stronger competition against the wild oats.



FERTILIZED

UNFERTILIZED

This picture illustrates the rapid early growth caused by fertilizer. The grain crop has gained an early advantage over the weeds in this field.

After Seeding Cultivation:

Experimental evidence shows that wild oats are slower in developing during the early stages of growth than the common cereals. This presents another opportunity to give the grain crop an advantage over the wild oat. If the grain crop, preferably barley, is seeded three to three and one-half inches deep it is possible to shallow cultivate after seeding without injury to the seed. Cultivation should be done before the sprout on the seed is more than one-half inch long, and should be shallow in order to leave the seed undisturbed. The rod weeder is probably the best implement to use for after seeding cultivation, but the wire weeder or even the drag harrow will kill a great many small weeds. Destroying a crop of wild oats at this time will permit the grain crop to become firmly established before another crop of wild oats can get started.

A Programme to Control Wild Oats:

In the preceding paragraphs an attempt has been made to

explain why apparently sound methods of cultivation and soil management often fail to control wild oats.

The next step is to outline a farm programme which will take into consideration the principles described above and still allow a profitable crop to be grown. In doing this it is obvious that the same programme will not suit all farmers, and for this reason we include some alternative measures for wild oat control. The first suggestion is a rotation which is designed to allow cultivation of the land at critical periods in the life of the wild oat. It is as follows:

Rotation I:

First year Fall cultivation.
Second year Olli barley.
Third year Olli barley.
Fourth year Summer fallow.
Fifth year Wheat or other grain crops.
Succeeding years crop is desired until the weed problem recurs.

Details of the Rotation:

First year—Shallow cultivation in the fall in order to cover the wild oats and other weeds and promote early germination the next year.

Second year—Shallow spring cultivation as soon as weed growth appears. Cultivate until late May or early June and seed immediately after the last cultivation to Olli barley at about $\frac{1}{4}$ more than the usual rate of seeding. If possible use 25 to 30 lbs. of Ammonium Phosphate 11-48 to speed up the growth of the barley crop. Harvest the crop as soon as ripe in order to prevent as many wild oats as possible from shattering on the ground. Barley should not be left until ripe enough to straight combine. Fall cultivate as described under the section "necessity for after-ripening."

Third year—The same procedure as in the second year.

Fourth year—Cultivate at least each time a crop of wild oats has reached a height of five inches. The first cultivations should be shallow and subsequent ones deeper in order to bring up any dormant seeds present in the soil. More frequent cultivations where there is no danger of soil drifting may be valuable in stirring the soil and bringing up more wild oats to "after-ripen."

Fifth year—Wheat or other cereal crop as desired.

In subsequent years a careful watch should be kept in order to detect any wild oats in the field. When an increase is noted the above described treatment should again be given.

Oats for greenfeed can be substituted for Olli barley in this rotation and will be equally effective. The greenfeed must be cut early, however, in order to prevent the wild oats maturing and shattering before the crop is cut. Many wild oats will mature in

the sheaf and care must be taken to prevent their spread by stock to which the bundles are fed.



UNFERTILIZED

FERTILIZED

This picture shows that the early advantage gained by the fertilized grain was carried right through to harvest. Note wild oats in unfertilized strip.

Forage Crops:

The choice of forage crops is left to the farmer concerned, but it might be well to discuss the advantages and disadvantages of a few of the more common forage crops and forage crop mixtures.

Brome grass has one distinct advantage. It may be used for hay or seed for two or three years, then plowed and allowed to re-establish itself, and again used for hay or seed for two or three years more. In order to give it a good opportunity to become re-established it should be plowed early in the spring and the land worked down immediately in order to conserve as much moisture as possible. The plowing will bring up many of the wild oat seeds which may have been buried at the time the crop was originally seeded. Such a programme is a very satisfactory method of eradicating wild oats.

If the crop is intended for seed, the field should be carefully examined for couch grass, as the presence of this weed would render the seed crop worthless.

The choice of forage crops other than brome will depend to a large extent on the part of the Province in which the problem arises. For detailed information on the selection and seeding of forage crops we would refer you to the Provincial Department of Agriculture Circular No. 63.

In general, the greatest weakness in crops other than brome grass is that they cannot be plowed down in the second or third year and be expected to re-establish themselves. If the land is not turned over, many wild oats may be dormant in the soil to infest the field after the forage crop has been plowed up. The forage crop could, of course, be broken up in the second or third year and re-seeded, but this would entail a considerable amount of labour and expense.

In spite of the danger of wild oats remaining viable under forage crops, many farmers, especially in the more moist areas of the Province, use this method of control with good success. There are a few points, however, which should be borne in mind where this method is used.

- (1) Do not allow wild oats to go to seed in the forage crop.
- (2) When the field is broken up plow early in order to be able to summer fallow the land thoroughly.
- (3) Kill at least one crop of weeds before seeding the land the next spring.
- (4) Use early barley the first year following breaking rather than wheat. Barley will help complete the cleaning up process, while wheat may cause a setback.

Common Causes of Failures in Controlling Wild Oats:

1. Failure to use clean seed.
2. Cultivation which buries the seed.
3. Failure to take into consideration the early ripening and early shattering habit of the seed.
4. Ineffective cultivation either through untimeliness, carelessness or poor or improperly adjusted implements.
5. Early seeding of cereals, particularly wheat, on summer fallowed lands. The summer fallow year may have served only to "after-ripen" the wild oats in the ground rather than cause them to grow and be destroyed.
6. Allowing live stock to feed upon material containing wild oats such as straw stacks or screenings, or the feeding of wild oat infested greenfeed, oat bundles or grain. This may cause infestation by the stock roaming over the fields, by work horses being used in cultivation operations, or by manure being returned to the land while it still contains viable seeds.

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